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HOW SELECTED SPECIALTY CROPS WERE PRODUCED IN THE BOISE AND PAYETTE VALLEYS OF IDAHO, 1947

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PREFACE

Field work on this study was completed in 1948. The data were then summarized and have already served many purposes. They are released in this report so that they will be more readily available for general use.

Thanks are due the 65 farmers who cooperated in the study. Appreciation is also expressed to the Bureau of Reclamation at Boise, Idaho, which gave assistance during the preliminary and field work phases; and to members of the Department of Agricultural Economics, University of Idaho, and the Bureau of Agricultural Economics, who assisted in an advisory capacity. O. L. Mimms of the Bureau of Agricultural Economics also assisted in some of the field work.

SUMMARY

Seed crops and corn and peas for processing are important enterprises in southwestern Idaho. They are important on many dairy farms as well as on cash-crop farms. About 28 percent of the cropland on 65 sample farms was planted to these crops in 1947. Acreage of vegetable seeds reached a peak there in 1944, reflecting the wartime loss of supplies from abroad. On the Boise Reclamation project in 1949 it was down 30 percent from the peak, but it was still well above the prewar 1936-39 acreage. In 1946-49 the acreage of seed crops was 2.5 times the 1936-39 level. It was the increasing interest in these crops that led to this study of practices and time used in producing them.

Except for fresh lettuce nearly all the production of the specialty crops covered in this study was grown under contract with seed companies or with processors. This arrangement influenced the location of the crops. Seed companies, for example, tend to concentrate their acreage in better adapted areas and with experienced growers. At the same time they try to scatter their contracts and limit the size of individual contracts in order to spread or lessen the risk of crop failure from hail and other causes.

Of the 9 specialty crops studied, onion seed and onion bulbs are most intensive in terms of total man-hours per acre, using 188 and 149 hours per acre respectively as shown in the following table:

Man and tractor hours per acre for producing and harvesting specialty crops, Boise and Payette Valleys, Idaho, 1947

Crops	Hours per acre for:							
	Preparing land		Planting to harvest		Harvest 1/		Total	
	Man	Tractor	Man	Tractor	Man	Tractor	Man	Tractor
Peas for processing	5.0	5.0	6.4	1.7	14.2	1.7	25.6	8.4
Sweet corn for processing	5.1	5.1	11.6	5.1	16.4	---	33.1	10.2
Hybrid sweet corn seed	5.9	5.9	60.4	6.5	10.2	2.7	76.5	15.1
Lima bean seed	7.1	7.1	19.6	5.4	3.8	2.5	30.5	15.0
Onion bulbs	5.3	5.3	87.8	6.8	56.3	1.8	149.4	13.9
Onion seed	4.0	4.0	97.1	11.4	87.0	1.8	188.1	17.2
Carrot seed	4.2	4.2	36.6	10.9	22.0	2.4	62.8	17.5
Lettuce seed	4.0	4.0	46.3	11.0	6.6	3.9	56.9	18.9
Spring lettuce	4.9	4.9	50.5 2/	6.2	17.8	---	2/ 73.2	11.1
Fall lettuce	5.4	5.4	36.9	5.8	17.8	---	60.1	11.2

1/ Motortrucks or horses were used for harvest as follows: Truck hours on peas 4.1 hours per acre, sweet corn for processing 2.7 hours, lettuce 2.2 hours. Horse hours on sweet corn for processing were 10.5 hours per acre.

2/ Data on harvesting spring lettuce are not available, but the practices and labor requirements are assumed the same as for fall lettuce.

Hybrid sweet corn for seed and fresh lettuce were next with 76 and 73 man-hours per acre. A high percentage of the time on these intensive crops was hand labor. The least intensive specialty crops studied were peas for processing (25.6 man-hours), sweet corn for processing (33.1), and lima bean seeds (30.5). Use of tractors was highest on lettuce seed, but only 19 tractor hours per acre were used. In comparison, the more widely grown sugar-beet crop used 92 man-hours per acre, and 16 tractor hours when the beets were topped by hand. For small grains only 18.6 man-hours per acre and 7.1 tractor hours were used.

Although nearly all heavy farm work and a good deal of the light work in this area is done with tractor power, horses are still used on some farms for much of the light work such as planting and cultivating row crops.

Among the many problems growers of specialty crops face are finding enough seasonal workers, controlling weeds, insects, seed loss from shattering, risks from weather, and price changes.

The seasonal labor problem may be important for almost any crop, but it is likely to be more critical when it comes to harvesting sweet corn for processing, detasseling hybrid sweet corn seed, and weeding onions. In order to be more nearly sure of harvesting at the proper time some farmers arrange exchange pools among themselves to avoid hiring labor. Seasonal labor is needed for hoeing sweet corn for seed but the biggest problem is getting the number of workers just when they are needed for the detasseling job, which is intermittent during a 3-to 4-week period. Labor for weeding and harvesting onion bulbs and onion seed may be critical because of the amount needed and the cost.

The onion thrip has been a serious problem in producing onions. It can be successfully controlled but the many dusting operations required are expensive.

Shattering is one of the more serious problems in the seed-lettuce enterprise. Cutting must often be done at night or when the tops are damp. Winds can cause terrific losses from shattering.

Fresh lettuce is a high-risk crop. As contrasted with other specialty crops in the area, it is not grown under contract. A buyer must be found at or near harvest time rather than before planting. Quality and local production as well as that in other areas and the situation in distant markets become major factors that affect the price the grower receives at harvest.

HOW SELECTED SPECIALTY CROPS WERE PRODUCED IN THE BOISE AND PAYETTE VALLEYS OF IDAHO, 1947

By Christian A. Stokstad, Agricultural Economist

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INTRODUCTION

Seed corn, vegetable seeds, peas and corn for processing, and head lettuce are important crops in parts of the Boise and Payette Valleys. During the World War II acreage in seed crops expanded greatly, and although demand has lessened since the war ended, more farmers are interested in growing these crops than formerly. The 1946-49 acreage was between 2 and 3 times more than that in 1936-39. Acreages of processing crops have increased with construction of several quick-freezing plants in the area in addition to the canneries already operating there.

Despite the importance of these crops little information has been published concerning their production in this area. This situation and the need for basic information concerning production prompted the study upon which this report is based. The report shows in brief for each of eight specialty crops what is used in the way of land, labor, and machinery, what production practices are, and what may be expected in the way of yields.

The detailed data on physical inputs, sequence, and usual dates of performance of various field operations, yields, rotations, and other cultural practices were obtained from 65 farmers.

The main areas of seed crops and head lettuce in the Boise Valley were ascertained largely from data taken from the 1946 Crop Census reports of the Bureau of Reclamation. The areas of sweet corn and peas for processing in

Canyon and Payette Counties were ascertained from records of processing companies. These records gave a complete account of the 1947 contracted acreage of peas and sweet corn for processing in the two counties.

DESCRIPTION OF THE AREA STUDIED

The Boise and Payette Valleys have warmer and longer growing seasons than any other area in the State, the growing season ranging from 150 to 180 days in length. The average annual precipitation in the area ranges from 8.4 to 13.1 inches. Less than a third of this falls during the growing season.

The topography of the valleys is generally level with some rolling and uneven land along the valley edges. Soils vary from light sandy loams to loams and the heavier soils of the Wilder Bench area. Hardpan is found from 1 to 7 feet under the surface.

The average size of farm in 1945 varied from 72 acres in Canyon County to 170 acres in Ada County, while the total cropland per farm ranged from an average of 45 acres in Ada County to 47 acres in Payette County. By 1950, the average size of farm in the three counties had decreased only about 1 acre, whereas the average total cropland per farm had increased about 3 acres. Most of the cultivated land and all of the intensive crops of the two valleys are irrigated.

The upper portion of the irrigated area of the Boise Valley has shallow, less productive soils, and consequently a large proportion of the land is used to produce pasture, forage, and feed crops for dairy production. Farther west, in Canyon County, more cash crops are grown, but dairying is still the usual type of farming (table 1). This county, however, had a much greater percentage of general and crop farms than Ada County. In the rolling lands of the Black Canyon Irrigation District, a greater proportion of the land is in hay and pasture than in the rest of the county, and dairying is more pronounced. In the Payette Valley, the percentage of general and crop farms is larger than in the Boise Valley but dairying is still the most common type of farming.

Specialty Crop Acreages

Acreages of specialty crops in 1947 by irrigation districts receiving water from the Boise Project of the Bureau of Reclamation are shown in table 2. Information by individual crops was not available in a number of districts and it was necessary to procure information on two processing crops, peas and sweet corn, from the processors. Contracted acreages for these crops in Canyon and Payette Counties are shown in table 3.

The chief specialty crop was seed corn, with 6,288 acres, of which the great majority was hybrid sweet corn. Its production was largely concentrated in the Boise-Kuna Irrigation Districts in the southern part of Canyon County and the southwestern part of Ada County. To a considerable extent production of lima bean seed was also centered in this district. Production of fresh lettuce was mainly in the Wilder Irrigation District.

Table 1.- Number of farms and percentage of farms by types for three southwestern Idaho counties, 1945 and 1950 1/

Item	Ada County		Canyon County		Payette County		3 Counties	
	1945	1950	1945	1950	1945	1950	1945	1950
Total number of farms	2,545	2,503	3,777	3,985	1,051	1,153	7,373	7,641
	Percentage of total							
Fruit and nut farms	1.9	.2	2.9	1.2	10.8	7.1	3.7	1.8
Vegetable and horticultural specialty farms	2.0	.2	6.6	1.4	5.9	2.9	4.9	1.2
All other crop farms	6.2	3.9	18.1	15.9	11.6	7.5	13.1	10.8
All crop farms	10.1	4.3	27.6	18.5	28.3	17.5	21.7	13.8
Dairy farms	53.6	48.3	37.0	29.3	26.6	32.2	41.2	35.9
Livestock farms	8.1	7.6	6.4	6.9	9.5	5.7	7.4	6.9
General farms	9.2	11.1	18.1	23.6	20.3	20.6	15.4	19.0
Other farms 2/	19.0	28.7	10.9	21.7	15.3	24.0	14.3	24.4

1/ Adapted from U. S. Census of Agriculture, 1945 and 1950 (preliminary).

2/ Includes farms producing products primarily for own household use, poultry farms, and unclassified farms.

Production of garden seeds was centered in the Boise-Kuna and Wilder districts. Production of onion seed was formerly centered in the Wilder area, but, because of thrip infestation, it had shifted south to the Boise-Kuna District and even across the Snake River into Owyhee County.

Seed companies tend to concentrate their acreages in districts that have the better soils and the more experienced growers. However, they also try to scatter their contracts over a given area and limit the size of individual contracts in order to spread the risk of hail or wind damage, insect infestation, and crop failure. In the case of small garden seeds, the acreage allotted to one grower ordinarily is small, but he can usually grow more than one crop. There is also a tendency to concentrate acreage of hybrid sweet corn seed in given areas because of the necessity for maintaining seed purity. Contracts will not be made if some other strain or variety of corn is planted nearby.

Markets and Marketing Agencies

Production of all the crops considered here, except fresh lettuce, hereafter referred to as specialty crops, was carried out almost entirely on a contract basis with seed or processing companies. The company contracts with the grower for the acreage to be planted, agreeing to furnish the necessary amount of seed of a designated variety at a fixed price, and to pay a designated price

Table 2.- Total cultivated acreage and acreage in specialty crops by irrigation districts receiving water from the Boise Project of the Bureau of Reclamation, 1947

Item	Boise - Kuna	Wilder	Nampa Meridian	Black Canyon	Pioneer	Farmers Cooperative Ditch Company	Other	Total
Total acres cultivated	44,482	49,328	60,808	28,581	32,000	14,000	38,327	267,526
Peas (processed and fresh for market)	8	869	67	122			12	1,078
Fresh sweet corn	8	319	14	476			74	891
Seed corn	4,108	954	766	91	350		19	6,288
Onion bulbs	22	11	6					39
Onion seed	231	65	81	22		20		419
Carrot roots	42							42
Carrot seed	439	61	42	33				575
Lettuce seed	29	173	30	24		100		356
Lima bean seed	1,209	150	537	148			54	2,098
Fresh lettuce	41	1,594	165				24	1,824
Seed crops:								
Unspecified			178				90	268
Other than corn					130			130
Garden-truck (unspecified)			191		950	1,470	515	3,126
Total	6,137	4,196	2,077	916	1,430	1,590	788	17,134

Bureau of Reclamation, 1947 data on acreages, crops, water deliveries, costs, revenues, and settlement, and unpublished data from the Bureau of Reclamation, Region I.

Table 3.- Sweet corn and peas for processing, contracted acreage Ada, Canyon, and Payette Counties, Idaho, 1947 1/

Crop	County			Total
	Ada	Canyon	Payette	
	Acres	Acres	Acres	Acres
Sweet corn	294	1,687	2,854	4,835
Peas	12	979	128	1,119
Total	306	2,666	2,982	5,954

1/ Assembled from information collected from processing companies in the area.

for the crops grown. The price may be on a field-run basis or on the basis of some quality test such as percentage of seed germination. The company is given authority to direct all phases of the planting, cultivation, irrigation, and harvesting of the crop, the grower agreeing to provide the land, labor, and machinery. Companies supervise their contracts through field men who visit the farms at the various stages of growth of the crop. In practice, however, the timing of the various operations is left to the discretion of the operator, with the field man acting as observer for the company and advisor to the grower. Processing companies exercise rather complete control over both planting and harvesting dates because the volume of processing crops that can be handled in any one day depends upon the capacity of the processing plant.

Fresh lettuce may be sold to any of a number of produce dealers in the area. The basis of sale depends chiefly upon the condition of the market at the time. If the market is good or is expected to be good, sales may be on a crate basis or a flat rate per acre. If the market is poor, some dealers will handle only on a consignment basis. Some farmers contract in advance with a dealer to handle their entire acreage, thus assuring themselves of an outlet and assuring the dealer of a minimum acreage.

SAMPLING

As the major portion of the specialty crops considered in this study was planted in the Boise-Kuna and Wilder districts, the sampling area for specialty crops other than processing corn and peas was confined to these two districts.

At the time the study was begun, information as to acreage of the 1947 crop was not available, so sample farms were selected at random from the modal acreages grown in 1946. Information was obtained from farmers in this sample who grew the same crop in 1947. For a few crops with small total acreages, in order to obtain a large enough sample, it was necessary to locate and obtain information from some farms that had not raised that crop in 1946.

For the two processing crops considered, a complete list of growers in the two counties in 1947 was obtained from the processors, and the sample was selected at random from the modal group of processing-crop acreages in Canyon and Payette Counties.

The total number of farms visited was 65. Of these, 22 were in Wilder Irrigation District, 27 in Boise-Kuna District, 6 in the Black Canyon, 4 in private irrigation districts in Canyon County, and 6 in the Payette Valley. Detailed practice information was obtained for 108 fields of the 8 specialty crops.

FARM ORGANIZATION

Size of Farm

Of the 65 farms visited, 19 were classified on a Census basis as dairy-type farms, and 46 as cash-crop farms (table 4). Farms were also classified as to size by the extent of irrigated acreage. The small farms had under 40 acres of irrigated cropland, the medium-sized farms from 40 to 79 acres, and the large farms 80 acres and over. The average total acreage of the sample farms was within 2 acres of the 1945 Census average for Canyon and Payette Counties. Dairy farms averaged slightly larger than cash-crop farms, and devoted more of their land to hay, pasture, and grain.

Land Use and Crops

Cash-crop farms devoted 58 percent of their acreage to row crops, while dairy farms used only 25 percent of their land for these crops. However, the difference in the acreage of land devoted to the 8 specialty crops was not so great. Dairy farms used approximately 20 percent of their irrigated cropland for the specialty crops, whereas cash-crop farms devoted about 30 percent to these crops.

Small farms had the largest percentage of land in row crops, a total of 65 percent, whereas large farms used about 50 percent for row crops, and medium-sized farms only 42 percent. Small farms also had the largest percentage of land in pasture, and the smallest in hay and grain. Medium-sized farms had the greatest percentage of land in grain. The small farms had a higher concentration of row crops than larger farms because relatively more cash-crop than dairy farms were concentrated in the group. Of the cash-crop farms 30 percent were in this group, which contained 15 percent of the dairy farms. The large farm group also contained 30 percent of the cash-crop farms, but had 28 percent of the dairy farms. The medium-sized group, which contained about 45 percent of all the farms, included 40 percent of the cash-crop farms and 58 percent of the dairy farms.

Of individual crops in the area, other than those covered in this study, alfalfa was the more common hay crop, mixed grain the usual grain crop, and sugar beets the chief row crop. An average of 20.2 acres of sugar beets was reported on 29 farms. About a third of the farms that reported alfalfa also

Table 4. - Average utilization of cropland per farm for types of crops by size and type of farm, Boise and Payette Valleys, Idaho, 1947

Size and type of farm	Farms	Irrigated cropland							
		Total acres	Specialty crops	Other row crops	Hay	Grain	Pasture	Other	Double-cropped
	Number	Acres	Acres	Acres	Acres	Acres	Acres	Acres	Acres
Under 40 acres									
Dairy	3	29.0	11.4	--	6.3	6.0	9.0	1.0	4.7
Cash crop	14	29.4	13.1	7.6	3.5	3.7	4.0	.5	3.0
All types	17	29.3	12.8	6.2	4.0	4.1	4.9	.6	3.3
40-79 acres									
Dairy	11	66.1	12.4	1.9	24.8	17.2	9.2	.6	--
Cash crop	18	60.3	16.0	17.0	10.9	10.1	5.8	3.0	2.5
All types	29	62.5	14.7	11.3	16.2	12.8	7.1	2.0	1.6
80 acres and over									
Dairy	5	101.2	19.1	8.6	32.0	21.2	20.3	--	--
Cash crop	14	113.7	33.8	31.4	27.4	14.2	10.1	.7	3.9
All types	19	110.5	30.0	25.4	28.6	16.0	12.8	.5	2.8
All sizes									
Dairy	19	69.5	14.0	3.4	23.7	16.5	12.1	.5	.7
Cash crop	46	67.1	20.5	18.5	13.7	9.4	6.6	1.5	3.1
All types	65	67.8	18.5	14.1	16.6	11.4	8.2	1.2	2.2

reported clover, both for hay and seed. Dairy farms averaged 8.5 acres more of alfalfa than cash-crop farms, whereas cash-crop farms averaged 3 acres more of clover. Acreage of grain crops increased with size of farm, and dairy farms averaged 50 percent larger acreages of grain than cash-crop farms.

The chief specialty crop in terms of acreage and number of farms reporting was seed corn (table 5). Large farms had almost twice as many acres per farm as small or medium-sized farms, whereas cash-crop farms averaged about 25 percent more than dairy farms.

Fresh lettuce and lima beans followed seed corn in importance, with fresh lettuce averaging 16.3 acres per farm reporting and lima bean seed 12.4 acres. Processing crops were reported by half the dairy farms, which in turn made up a third of the farms reporting these two crops.

For the garden seeds--carrots, onions, and lettuce--the average acreage per farm reporting varied from 5.3 acres for onion seed to 9.0 acres for lettuce seed. Of the farms reporting garden seeds, about 75 percent were cash-crop farms

More than half of the farms reported more than one specialty crop, and a fourth of them reported three or more. Fifty-four percent of the cash-crop farms reported more than one specialty crop while 69 percent of the dairy farms reported only one.

Livestock

All but three of the 65 farms visited reported livestock (table 6). Dairy cows were the more common type of livestock; they were reported on 58 farms and averaged 8.2 cows per farm. Feeder cattle were reported on a few large farms only. Sheep were reported on 6 farms, and of these, flocks were larger on the cash-crop farms. Pigs were raised on 21 farms, averaging more per farm on dairy farms. Chickens were reported on 39 farms, with the flocks averaging more than twice as many hens on dairy farms as on cash-crop farms. Work horses were reported on 41 farms, averaging 2.3 horses per farm. Eighty-one percent of the dairy farms, and 54 percent of the cash-crop farms reported horses.

Tractors

Tractors were reported on 55 farms and two others hired tractors to do field work (table 7). All large farms reported tractors, averaging 1.4 tractors per farm. Eighty-six percent of the medium-sized and 64 percent of the small farms reported tractors.

The size of tractors varied from an average of 13-drawbar horsepower for the small farms to 15.9 DBHP for the large farms. There was little difference in average DBHP between types of farms. Tractor size was most closely related to size of farm. Annual use increased with size of farm and averaged slightly larger for cash-crop farms than for dairy farms.

Table 5.- Number of farms reporting and average acreages of specialty crops, by size and type of farm, Boise and Payette Valleys of Idaho, 1947

Item	Size of farm			All farms	Type of farm	
	Under 40 acres	40-79 acres	80 acres and over		Dairy	Cash crop
Number of farms surveyed	17	29	19	65	19	46
Number of farms reporting:						
Peas (for processing)	5	3	4	12	4	8
Sweet corn (for processing)	3	6	3	12	6	6
Seed corn	3	13	9	25	9	16
Lima bean seed	3	3	6	12	1	11
Carrot seed	3	6	3	12	3	9
Carrot roots	--	3	2	5	2	3
Onion seed	2	7	5	14	2	12
Onion bulbs	--	7	3	10	3	7
Lettuce seed	1	6	3	10	2	8
Fresh lettuce	3	5	3	11	--	11
Average acreage per farm reporting:						
Peas (for processing)	9.2	7.4	11.1	9.4	10.6	8.8
Sweet corn (for processing)	10.5	10.3	9.7	10.2	9.7	10.8
Seed corn	10.4	11.7	20.0	14.5	12.2	15.8
Lima bean seed	5.8	11.3	17.8	12.4	9.0	13.6
Carrot seed	7.0	5.0	5.7	5.6	7.0	5.2
Carrot roots	--	.5	1.8	1.0	.8	1.2
Onion seed	2.5	3.9	8.4	5.3	3.0	5.7
Onion bulbs	--	3.0	5.7	3.8	3.0	4.2
Lettuce seed	18.0	4.2	15.7	9.0	4.8	10.1
Fresh lettuce	15.7	10.0	27.4	16.3	--	16.3
Average total acreage specialty crops per farm	12.8	14.7	30.0	18.5	14.0	20.5

Table 6.- Average livestock inventory January 1, 1947, per farm reporting, by size and type of farm, Boise and Payette Valleys, Idaho, 1947

Item	Size of farm			All farms	Type of farm	
	Under 40 acres	40-79 acres	80 acres and over		Dairy	Cash crop
	Number	Number	Number	Number	Number	Number
Number of farms	17	29	19	65	19	46
Number of farms reporting livestock	15	29	18	62	19	43
Work horses per farm reporting	2.4	2.3	2.5	2.3	2.3	2.3
Dairy cows per farm reporting	4.4	7.8	11.9	8.2	12.5	6.1
Other dairy cattle per farm reporting	2.8	5.5	6.6	5.4	7.4	4.0
Feeder cattle per farm reporting	--	--	42.3	42.3	39.0	44.0
Sheep per farm reporting	1.0	5.3	29.5	12.7	9.0	16.5
Pigs raised, 1947, per farm reporting	2.5	6.2	11.8	7.5	9.2	6.9
Chickens per farm reporting	15.2	25.6	62.1	33.5	49.1	23.8

Table 7.- Number, size, age, and use of tractors by size and type of farm, Boise and Payette Valleys, Idaho, 1947

Size and type	Farms reporting	Average acres irrigated cropland	Tractors on farms	Average rated DBHP per tractor	Average rated DBHP per farm	Average age of tractor	Average hours annual use per tractor
	Number	Acres	Number	DBHP	DBHP	Years	Hours
Under 40 acres							
Dairy	2	25.2	2	18.1	18.1	9	400
Cash crop	9	29.0	10	12.0	13.3	6	325
40-79 acres							
Dairy	10	66.5	10	13.2	13.2	4	436
Cash crop	15	61.0	15	13.6	13.6	6	595
80 acres and over							
Dairy	5	101.2	5	15.9	15.9	6	660
Cash crop	14	113.7	22	15.9	25.0	5	642
All sizes							
Dairy	17	71.9	17	14.6	14.6	5	510
Cash crop	38	72.6	47	14.4	17.8	6	560
All types	55	72.4	64	14.4	16.8	6	546

Labor

Family labor other than the operator was reported on about 41 percent of the cash-crop farms (table 8), and approximately 59 percent of the dairy farms reported the use of family labor. On the average, two family workers were reported per farm, with the family workers on cash-crop farms averaging slightly longer hours and more work days per year.

Hired labor was used to a greater extent on cash-crop farms. Regular hired labor paid on a monthly basis was used by 11 cash-crop farms and one dairy farm, whereas seasonal general hired labor paid on an hourly basis was employed on five cash-crop and two dairy farms.

Exchange labor was reported by 53 farms, with an average of 2.5 exchange labor operations per farm reporting. Among the operations for which exchange labor was used were planting seed crops, harvesting processing crops, combining, threshing, haying, and trucking.

Custom work involving the use of labor and machinery was hired by 62 farms for an average of 3.1 operations per farm reporting. Operations commonly hired on a custom basis were trucking, combining, threshing, chopping and baling hay, and dusting or spraying. Ground preparation operations were hired in a few cases.

PRODUCTION PRACTICES

Rotations

Most of the farms reported rotation between intertilled, sod, and grain crops. Growers commonly followed a rotation of 3 to 4 years in alfalfa and 3 to 6 years in grain and intertilled crops. However, this rotation varied widely during the war and early postwar periods. Usual deviations were to delay the return to alfalfa by greater use of fertilizers, planting of clover for seed, and use of green-manure crops.

Certain crops commonly follow other types of crops. In table 9 specialty crop acreages in 1947, and percentages of land utilization by types of crops grown in 1946 are shown. Corn, both for seed and for processing, followed sod crops on more than a third of the acreage, and fresh lettuce was always planted following an intertilled crop. The crops that followed grain crops most often were carrot seed, with 27 percent of its acreage, lima bean seed, and sweet corn for processing. The only crop reported to follow a green-manure crop was 7.3 acres of lima-bean seed, but other farms reported practicing green manuring on fields on which detailed information was not obtained. About 16 percent of the peas for processing were planted on land that had been fallow or idle the previous year. The earliness of the pea harvest made it a good crop for land on which control measures against Morning Glories or other weeds could be taken.

Crops usually planted twice in succession were lettuce and lettuce seed, lima-bean seed, and seed and processing corn. Forty-one percent of the fall lettuce acreage was planted on land on which spring lettuce had been grown.

Table 8.- Family, and regular hired labor, and farms reporting exchange and custom labor, by size and type of farm, Boise and Payette Valleys, Idaho, 1947

Item	Size of farm				Type of farm	
	Under 40 acres	40-79 acres	80 acres and over	All farms	Dairy	Cash crop
	Number	Number	Number	Number	Number	Number
Farms	17	29	19	65	19	46
Family labor, excluding operator						
Farms reporting	4	14	12	30	11	19
Workers per farm reporting	1.8	2.4	1.9	2.1	2.4	1.9
Days worked per worker	22	118	132	113	84	133
Regular hired labor (monthly basis)						
Farms reporting	--	1	11	12	1	11
Workers per farm reporting	--	1.0	1.2	1.2	1.0	1.2
Months worked per worker	--	12.0	10.0	10.1	12.0	10.0
Seasonal general hired labor (hourly basis)						
Farms reporting	1	5	1	7	2	5
Workers per farm reporting	1.0	1.0	1.0	1.0	1.0	1.0
Days worked per worker	90	53	90	64	55	67
Exchange labor						
Farms reporting	14	25	14	53	13	40
Operations per farm	2.6	2.4	2.4	2.5	2.2	2.6
Custom work						
Farms reporting	14	29	19	62	19	43
Operations per farm	3.3	3.1	2.9	3.1	2.8	3.2

For all the specialty crops, about 19 percent of the acreage was planted following the same crop, and 46 percent following other intertilled crops. Twenty-three percent was planted following sod crops and 9 percent following grain crops.

Some operators liked to follow corn with beans or beets, and lettuce with beets because of easy soil-working conditions. Early maturing crops such as peas, early potatoes, or turnip seed were sometimes chosen because of the possibility of double cropping with late crops such as fall lettuce, late seed potatoes, late grain, or a green-manure crop such as Hubam clover.

Table 9.- Specialty crop acreages 1947, and percentages of the land in different types of crops in 1946, on sample farms, Boise and Payette Valleys, Idaho

Crop in 1947	1947 acreage	1946 uses of the 1947 acreages				
		Sod crops	Grain	Intertilled crops		Other 1/
				Same as 1947	Other	
	Acres	Percent	Percent	Percent	Percent	Percent
Peas (for processing)	83.8	23.9	10.7	--	48.9	16.5
Sweet corn (for processing)	95.0	38.9	17.4	22.6	21.1	--
Seed corn	217.5	57.2	7.4	17.9	17.4	--
Lima bean seed	102.5	--	16.6	36.1	40.0	7.3
Onion seed (seed-to-seed)	10.0	--	--	20.0	80.0	--
Onion seed (fall planting)	34.5	8.7	14.5	13.0	63.8	--
Onion seed (spring planting)	29.0	--	--	--	100.0	--
Onion bulbs	14.5	17.2	--	--	82.8	--
Carrot seed	66.5	10.5	27.1	3.4	59.0	--
Carrot roots	3.5	--	--	--	100.0	--
Lettuce seed	54.0	9.3	--	34.2	52.8	3.7
Fresh lettuce (spring)	48.0	--	--	--	100.0	--
Fresh lettuce (fall) 2/	105.5	--	--	40.7	59.3	--
Total	864.3	23.0	9.4	19.4	45.5	2.7

1/ Idle or fallow except for lima bean seed which was preceded by green manure.

2/ Crops immediately preceding fall lettuce were spring crops harvested in 1947.

Fertilizers

Types and combinations of fertilizers, rates of application of the more common type of commercial fertilizers, and percentage of acreage reporting application of any fertilizer the previous year are shown in table 10. The largest percentages of fertilized acreages were planted to fresh lettuce, onion seed, and seed corn. The largest percentages of acreages receiving applications of manure were planted to seed corn and onion bulbs.

The smallest percentages of fertilized acreage were reported for the processing crops, sweet corn and peas. Although 28 percent of the acreage of carrot seed was fertilized, several growers thought that yields of carrot seed were higher when no fertilizer was used, and when the soil was depleted after several years of row-cropping.

The heaviest applications of commercial fertilizer were reported on lettuce and onion bulbs, with "complete" type fertilizers commonly used. Applications of fertilizer to seed lettuce were of the "complete" type, although not so heavy as for fresh lettuce. Commercial fertilizer was applied to only one field of peas for processing. Fertilizers usually applied to sweet corn for processing were nitrates, at a rate of 147 pounds per acre. Superphosphate (18 percent) was commonly used on seed corn, and lima bean, onion and carrot seed. In

many instances, superphosphate was applied because farmers could not procure the desired quantities of the treble superphosphate type (43 percent), which was cheaper per pound of available phosphorus.

Fertilizer was broadcast or drilled on about a fourth of the acreage to which fertilizer was applied. The remainder of the acreage of fertilizer received applications as side dressings which were performed as part of the regular cultivating operation. The labor involved in side dressing is included in the labor requirements for cultivating.

Manure was commonly hand loaded and was ordinarily applied with tractor-or horse-pulled manure spreaders.

Seeding Rates and Practices

Averages and ranges in seeding rates are shown in table 11, together with the more commonly used row widths. Peas for processing were usually drilled. Only one farm reported peas planted in rows 16 and 24 inches apart at a rate of 150 pounds to the acre, which is somewhat less than the average rate of 211 pounds per acre for all farms. Some processors felt that row planting would result in less waste during harvest, and hence larger yields, and were planning on increasing row-planted acreage. Sweet corn for processing was planted at a lower rate per acre and with the rows farther apart than was sweet corn for seed.

The planting rate of onion bulbs for seed varied widely, with the white onion varieties ranging from 3,600 to 4,500 pounds per acre, while the yellow varieties ranged from 1,200 to 4,800 pounds per acre. Average amounts planted were about 4,000 pounds of bulbs per acre for the white varieties and 3,200 pounds for the yellow varieties. Carrot roots planted for seed ranged from 1,400 to 3,000 pounds of roots per acre, with an average of about 1,800. The wide range in amounts planted may have been due partly to differences in size of bulbs and roots, and partly to error on the part of the farmer in estimating the weights used. Lima bean seed was planted at an average rate of approximately 100 pounds per acre, with a usual distance between rows of 24 inches.

Root crops and low-growing crops such as lettuce were ordinarily planted in beds, with widths ranging from 14 to 20 inches for white varieties of onion seed for bulbs to 16 and 22 inches for fresh and seed lettuce. When more than one of these crops were grown on the same farm, the usual practice was to plant at the same widths in order to save the work of adjusting cultivators during cultivation.

The quantity of seed planted for onion bulbs ranged from 1.5 to 7 pounds per acre, with the white varieties averaging more than the yellow. Planting rates for fresh lettuce and lettuce seed were almost the same.

Table 10.- Percentage of specialty crop acreage receiving fertilizers and rates of application, by types and combinations of fertilizers, 1947, on sample farms Boise and Payette Valleys, Idaho

Crop	Acres	Percentage of 1947 acreage receiving			Commercial fertilizer applications per acre			Percentage of acreage fertilized in 1946
		Manure only	Commercial fertilizer only	Both	All types	Most common		
						Amount	Kind	
	Number	Percent	Percent	Percent	Pounds	Pounds	N-P-K	Percent
Peas (for processing)	81.8	20.2	7.7	--	200	200	10-16-8	43.0
Sweet corn (for processing)	95.0	--	13.7	6.3	147	200	32.5-0-0	23.7
Hybrid sweet corn seed	193.5	22.7	47.3	15.0	193	289	0-18-0	50.6
Lima bean seed	102.5	11.7	14.6	5.9	369	370	0-18-0	70.2
Onion seed	73.5	10.9	72.8	--	319	293	0-18-0	55.1
Carrot seed	66.5	6.0	22.6	--	250	250	0-18-0	50.4
Lettuce seed	54.0	--	56.5	--	257	250	10-18-6	45.4
Onion bulbs	26.5	60.3	18.9	--	545	600	12-12-0	34.5
Fresh lettuce (spring)	48.0	--	41.7	58.3	562	800	5-10-10	79.2
Fresh lettuce (fall)	105.5	--	74.4	16.1	392	400	5-10-10	71.6

Table 11.- Seeding rate averages and ranges and common row widths for specialty crops, Boise and Payette Valleys, Idaho, 1947

Crop planted	Acres planted	Seeding rates per acre		Common row width
		Average	Range	
	Acres	Pounds	Pounds	Inches
Peas (for processing)	81.8	211	100-350	Drill
Sweet corn (for processing)	95.0	7.6	6-12.5	36
Hybrid sweet corn seed	193.5	12.2	8-22	32
Hybrid field corn seed	9.5	10.0	10	34
Open pollinated sweet corn seed	24.5	10.6	10-12	34
Lima bean seed	102.5	98.3	50-110	24
Onion bulbs for seed				
Yellow varieties	23.5	3,217	1,200-4,800	32
White varieties	32.0	4,012	3,600-4,500	34
Carrot roots for seed	66.5	1,813	1,400-3,000	32
Onion seed for bulbs (all)	26.5	4.35	1.5-7.0	--
Yellow varieties	20.5	3.87	1.5-5.0	1/16 and 24
White varieties	6.0	6.00	4.0-7.0	14 and 20
Lettuce seed	54.0	1.94	.75-5.0	16 and 22
Fresh lettuce (spring)	48.0	1.85	.75-3.0	16 and 22
Fresh lettuce (fall)	105.5	1.88	.75-5.0	16 and 22

1/ Commonly planted in 2-row beds. The smaller distance is between rows in a bed and the larger distance is between rows in adjacent beds.

Irrigation

All irrigation of specialty crops was done in corrugations. For some crops, such as peas for processing, the corrugating was performed shortly after planting, whereas for others it was done shortly before the first irrigation, or in connection with a regular cultivation.

The length of the irrigation season, the amounts of water applied, and the labor used for the various specified crops are shown in table 12. In general, those crops with longer irrigation seasons, such as root crops and larger seed crops, required more water and labor than did shorter season crops, such as small seeds, and fresh and processing crops. In a 90-day irrigating season, carrot seed used 3 acre-feet of water and 7.94 man-hours per acre for irrigating, and in a 117-day season, hybrid sweet corn seed used 2.29 acre-feet of water and 6.48 man-hours per acre for irrigating. In a 44-day season, peas for processing used only 1.33 acre-feet of water and 4.27 man-hours per acre.

Table 12.- Irrigation. Average date of first and last irrigation, quantity of water used, and hours of labor spent irrigating specialty crops, Boise and Payette Valleys, Idaho, 1947

Crop	Fields	Size of field	Irrigations	Date of first irrigation	Date of last irrigation	Irrigation season	Water per acre	Irrigation labor per acre
	Number	Acres	Number			Days	Acre-feet	Man-hours
Peas (for processing)	11	7.6	3.4	4/26	6/9	44	1.33	4.27
Sweet corn (for processing)	13	6.6	5.4	5/17	8/13	88	1.16	5.51
Hybrid sweet corn seed	19	10.2	7.2	4/18	8/13	117	2.29	6.48
Other seed corn	5	6.8	4.6	4/27	8/5	100	1.98	4.00
Lima bean seed	11	9.3	5.6	4/30	8/19	111	2.94	5.23
Carrot seed	12	5.6	7.8	5/16	8/14	90	3.00	7.94
Onion bulbs	6	4.4	7.3	5/16	8/12	88	2.39	4.40
Onion seed	14	5.2	7.4	5/9	7/26	78	1.85	4.90
Lettuce seed	9	6.0	5.2	5/15	8/1	78	1.50	3.41
Fresh lettuce (spring)	5	9.6	4.4	4/23	6/6	44	1.72	4.67
Fresh lettuce (fall)	10	10.6	5.3	7/24	9/27	65	2.53	4.80

A number of factors influenced the amounts of water and labor used on the different crops. The first irrigation usually requires more labor than subsequent irrigations because it is necessary to connect the corrugations with the ditch, and water takes longer to reach the end of the row due to the greater penetration into the loosely worked soil.

For crops such as corn and beans, which are planted late enough to avoid frost damage, irrigating is usually done before preparation of the ground for planting is completed. As the ground has been disturbed following the first irrigation, the second irrigation requires about as much labor and water as the first. Very late planted crops, such as fall lettuce and carrot roots, were necessarily irrigated after planting and required frequent and careful irrigations when the root systems were very small.

On the other hand, early planted and early harvested crops, such as spring lettuce and peas for processing, have fewer irrigations and do not consume large quantities of water and labor because there is usually some rainfall during the growing period, and harvesting takes place before there has been a great deal of hot weather.

Other factors that influence the consumption of water and labor in irrigating are the quantities of water available, the slope of the land, and the character of the soil, as well as the experience of the irrigator.

Sequence and Timing of Crop Operations

The average dates of performance, length of field-work season, and number of major field operations are shown in tables 13 and 14.

Plowing may be done either in the fall or in the spring. Fall plowing is usually the more desirable as the land can be worked easier and earlier in the spring. Spring lettuce, which was the earliest planted specialty crop, was all planted on ground that had been fall plowed. Only about 20 percent of the hybrid sweet corn seed, which is usually planted about the first of May, was planted on fall-plowed ground. A factor that influences fall plowing is the type of soil. In a few areas in which the soil was light and subject to blowing, the extent of fall plowing was limited. In some cases, farmers held for spring-plowing land on which manure was to be applied during the winter. The extent of fall plowing was also influenced by the date of completion of the previous harvest and the date on which the ground was frozen so as to prevent plowing.

The operations between plowing and planting varied somewhat in number and sequence. The usual order of operation after plowing was to disk, then spike-tooth harrow, and finally level before planting. Disking was done from one to three times over, in some cases consecutively and in others alternately with other operations. It was the first operation to follow plowing on 77 percent of fall-plowed fields, whereas it followed plowing on only 56 percent of spring-plowed fields. Fields that were not disked after plowing were harrowed. Spike-tooth harrowing was done from one to nine times over, averaging almost three times over on each field, with an average of four times over for lima bean and hybrid sweet corn seed. The leveling operation was usually performed only once except for the crops for which the ground is irrigated before planting. For

Table 13.- Dates of performance of planting and harvesting operations and length of seasons for specialty crops on survey farms, Boise and Payette Valleys, Idaho, 1947

Crop	Fields	Size of fields	Fields fall plowed	Average beginning date: Spring planting	Average beginning date: Harvesting	Length of harvest season: Average	Length of harvest season: Maximum	Length of field-work season: Average	Length of field-work season: Maximum
	Number	Acres	Number	Date	Date	Days	Days	Days	Days
Peas (for processing)	11	7.6	8	3/2	6/20	3	7	107	127
Sweet corn (for processing)	15	6.3	6	4/20	9/1	4	17	140	181
Hybrid sweet corn seed	19	10.2	4	3/28	10/4	8	43	198	250
Lima bean seed	11	9.3	5	3/26	9/19	20	34	183	211
Carrot seed	12	5.6	7	3/9	9/5	8	16	189	204
Onion seed	13	5.2	11	3/2	8/8	21	34	1/ 177 2/ 144	1/ 185 2/ 166
Onion bulbs	6	4.4	3	3/10	9/4	3/ 6	3/ 21	3/ 195	3/ 201
Lettuce seed	9	6.0	8	2/15	8/15	6	8	167	194
Fresh lettuce (spring)	5	9.6	5	--	6/9	2	10	112	118
Fresh lettuce (fall)	10	10.6	--	7/7	10/15	5	11	104	139

1/ Length of field-work season for spring-planted onion bulbs for seed.
2/ Length of field-work season for fall-planted onion bulbs for seed.
3/ Length of season only for onion bulbs harvested for replanting for seed.

Table 14.- Average dates of performance and number of field operations between planting and harvesting for specialty crops on survey farms, Boise and Payette Valleys, Idaho, 1947

Crop	Fields	Size of fields	Cultivating				Hoeing				Other Operations				
			Fields	Times	First time	Last time	Fields	Times	First time	Last time	Operation	Fields	Times	First time	Last time
	No.	Acres	No.	No.	Date	Date	No.	No.	Date	Date		No.	No.	Date	Date
Peas(for processing)	11	7.6	1	3.0	3/25	5/4	--	--	--	--	Dust	11	2.3	5/24	6/14
Sweet corn(for processing)	15	6.3	15	3.0	6/10	7/7	1	2.0	6/1	6/11		--	--	--	--
Hybrid sweet corn seed	19	10.2	19	4.4	5/20	6/29	10	1.0	6/9	--	Detassel	19	8.4	7/9	7/28
Lima bean seed	11	9.3	11	4.3	5/31	7/13	11	1.5	6/19	7/27		--	--	--	--
Carrot seed	12	5.6	12	5.0	4/16	6/16	6	1.3	5/18	6/9		--	--	--	--
Onion seed	13	5.2	13	4.5	4/11	6/4	6	1.7	5/8	6/18	Dust	10	2.3	6/4	7/11
Onion bulbs	6	4.4	6	5.0	4/13	6/27	5	3.2	5/3	7/8	Dust	4	1.5	6/29	7/7
Lettuce seed	9	6.0	9	5.5	4/22	6/22	6	1.3	6/6	7/14	(Block	6	1.0	5/2	--
											(Dust	1	1.0	6/26	--
Fresh lettuce (spring)	5	9.6	5	4.4	4/6	5/17	4	1.5	4/26	5/19	Block	5	1.0	4/11	--
Fresh lettuce (fall)	9	10.6	9	3.9	8/10	9/6	8	1.1	9/3	9/13	Block	9	1.0	8/16	--

crops such as sweet corn for seed and processing and lima bean seed, the ground is usually harrowed and sometimes leveled, then corrugated and irrigated. After irrigation the operations are usually performed in their normal sequence. For crops planted in beds, such as lettuce, the last operation before planting is marketing or bedding. An operation not so commonly used in preparing the ground for planting is spring-tooth harrowing, which usually followed plowing. Some few farmers disk and harrowed in the same operation, and one farmer disked, harrowed, rolled, and corrugated in one operation, behind a track-laying tractor. The earliest work in the spring was done in late February in preparation for planting spring lettuce. The next crops prepared for were onion and carrot seed, onion bulbs, lettuce seed, and peas for processing in early March. For these crops the time elapsing from the average date of beginning of spring work until planting ranged from 6 days for spring lettuce to 17 days for peas for processing. For crops planted later the period ranged from 27 to 43 days.

Average planting dates for spring-planted crops ranged from February 26 for spring lettuce through May 21 for sweet corn for processing and June 16 for carrot roots. Two crops, onions for seed and spring lettuce, can be planted in the fall or early winter. The seed or sprouted plants over-winter in the ground and get an earlier start in the spring. However, in an open winter, there may be considerable loss from winter-kill due to alternate freezing and thawing.

Cultivating was commonly done following planting. The later planted crops, processing and seed corn and lima bean seed, were usually harrowed once or more shortly after planting. Carrot seed was usually rolled or cultipacked following the planting of the roots. The length of time between planting and the first cultivation ranged from 13 days for lima bean seed to about 40 days for spring lettuce and lettuce seed. Crops that are normally blocked and thinned, such as lettuce and lettuce seed, often were cultivated just before and immediately following blocking. The average length of the cultivating period ranged from 27 days for fall lettuce to 68 days for onion bulbs. The average number of cultivations per crop ranged from 3 for sweet corn for processing to 5.5 for lettuce seed. The average length of time between cultivations ranged from 9 days for fall lettuce to 19 days for onion bulbs.

Most of the specialty crops, except sweet corn and peas for processing, were commonly hoed or hand-weeded. Onion bulbs were weeded the greatest number of times, an average of 3.2 per field, followed by onion seed. Hybrid sweet corn seed was hoed on an average once during the season. Hybrid sweet corn seed also required detasseling of the female line rows. The number of times the plants were detasseled varied somewhat with the strain or variety of the corn. The average field was gone over between 8 and 9 times over a period of about 3 weeks in July.

A few crops required dusting, usually during the latter part of May, June, and July. All fields of peas for processing were dusted, averaging 2.3 times, usually by airplane. In some cases, the second and third dustings did not cover the entire field, but merely the edges where the insects had come in from adjoining fields. About 80 percent of the onions, both for seed and for bulbs, were dusted for onion thrip by air or from the ground. The onion seed crop was dusted an average of 2.3 times while the bulbs were dusted only about 1.5 times. One field of lettuce seed required dusting for a bad infestation of aphids.

The earliest harvested crops were spring lettuce and peas for processing, which were harvested in June. Next to be harvested were onion and lettuce seed, which were cut during the early part of August and dried from 10 to 21 days before threshing. Sweet corn for processing, carrot seed, and onion bulbs were harvested early in September and lima bean seed in the latter part of the month. Sweet corn seed was harvested primarily in October, although some was picked in the latter part of September and put through driers to reduce the moisture content Fall lettuce was usually cut in mid-October.

LABOR USED FOR FIELD OPERATIONS

Land Preparation

As land preparation operations before planting are similar for most crops, the labor inputs and rates of performance for them were computed on a basis of total acreage rather than for each crop. Man hours of labor and performance rates from plowing through leveling up to planting are shown in table 15 for the more common sizes of implements used with tractor power. Data from this table were used in computing the land preparation requirements for all the specialty crops considered in this report.

A summary of the hours per acre used for the three phases of production of these specialty crops was shown in the summary on page 1[illegible]. A more detailed discussion of requirements by individual operations for each crop follows. The implement commonly used on tractor-powered farms, and its size, the number of farms reporting the given operation, and the usual number of times over the ground the operation is performed are given in each table. Man-hours per acre shown are computed on the basis of the average time used with the most common size of implement times the usual number of times the operation is performed.

Peas for Processing

Labor and power requirements for usual crop operations for peas for processing are shown in table 16. For the usual operations of plowing, disking, harrowing, and leveling, an average of 5.0 man and tractor hours per acre was required. Using a 7-foot drill, planting was accomplished at a rate of one acre per hour. Corrugating required an average of 0.7 man-and tractor-hours per acre, while irrigating the usual 4 times required 4.7 man-hours per acre.

Cutting peas with a mower required an average of 1.7 man-and tractor-hours per acre, using a 6-foot mower. This operation proved to be slow. It was necessary not to get too far ahead of the rest of the harvesting operation and thus cause undue loss of weight and quality through evaporation and wilting.

Harvesting and hauling operations required an average of 12.5 man-hours and 4.1 truck-hours per acre, or an average of 3 men per truck. Vines were usually loaded on the trucks by hand; only two farms reported the use of hay or green crop loaders. In general, the number of man-hours per ton was less on fields with larger yields. The weather may also play a part in labor requirements for harvesting. If peas are at optimum quality at a time when the fields are wet from rain, the operation is slowed down considerably..

Table 15.-Rates of performance, land preparation, field operations for specialty crop farms using tractor power, by common sizes of implements, Boise and Payette Valleys, Idaho, 1947

Operation	Number of cases	Average DBHP tractor rating	Width of implement	Tractor hours per acre 1/	Acres covered per hour
Plowing sod or alfalfa	14	14.5	1-bottom, 16 inch	2.5	0.40
Plowing row-crop stubble land	8	11.8	1-bottom, 14 inch	2.2	0.46
	54	13.8	1-bottom, 16 inch	2.1	0.48
	11	15.8	1-bottom, 18 inch	2.0	0.50
	7	17.9	2-bottom, 14 inch	1.5	0.66
Disking tandem	9	12.8	4.5-foot	.8	1.21
	54	13.5	6-foot	.7	1.43
	16	17.6	8-foot	.6	1.58
Harrowing, spike-tooth	32	14.7	2-section	.4	2.26
	46	15.7	3-section	.3	3.31
Leveling	23	15.5	6-foot	.7	1.47
	7	13.0	7-foot	.6	1.67
	49	14.9	8-foot	.6	1.76
	10	15.4	9-foot	.7	1.52
Corrugating	15	13.8	2-row cultivator	.9	1.16
	9	13.5	3-row corrugator	.8	1.17
	9	14.3	4-row cultivator	.7	1.45
Spreading manure (hand load)	6	15.3	----------	6.4	.16
Broadcasting fertilizer	10	14.0	----------	.7	1.50

1/ Man-hours per acre were the same as those for the tractor except for an undetermined amount of time to service the equipment.

Table 16.- Peas for processing, average labor, tractor, and truck hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre		
				Man	Tractor	Truck
Plow	16-inch plow	10	1.0	2.1	2.1	---
Disk	6-foot	9	2.0	1.4	1.4	---
Harrow	3-section harrow	9	3.0	.9	.9	---
Level	8-foot leveler	9	1.0	.6	.6	---
Ground preparation	-----	--	---	5.0	5.0	---
Plant	7-foot drill	10	1.0	1.0	1.0	---
Corrugate	4-row cultivator	9	1.0	.7	.7	---
Irrigate	-----	10	4.0	4.7	---	---
Planting till harvest	-----	--	---	6.4	1.7	---
Cut	6-foot cutter	10	1.0	1.7	1.7	---
Harvest and haul		6	1.0	12.5	---	4.1
All harvest 2/	-----	--	---	14.2	1.7	4.1
Total	-----	--	---	25.6	8.4	4.1

1/ One farm not reported here used horse-drawn equipment for harrowing, leveling, and corrugating. One farm harvested with 3 tractors, one with tractor and 2 horses, one with 3 tractors and truck and one with 6 horses and 1 truck.

2/ The average yield was 0.86 ton per acre for which an average price of $82.60 per acre was received.

Sweet Corn for Processing

The labor and power requirements for usual crop operations for sweet corn for processing are shown in table 17. For the usual ground preparation, a total of 4.2 man-and tractor-hours per acre were required. As corn is ordinarily irrigated before planting, 0.9 man-and tractor-hours per acre were required for corrugating, giving a total of 5.1 man-and tractor-hours per acre for ground preparation.

Planting with a two-row tractor-powered planter required 1.1 man-hours per acre, whereas 8 farms using two-row horse-powered planters averaged 1.3 man-hours and 2.6 horse-hours per acre. Eight farms also used 2-row horse-powered cultivators, which required 5.2 man-hours and 10.4 horse-hours per acre.

Corrugating after planting was usually accomplished during the regular cultivations, which were performed an average of 3 times and required a total of 4 man-and tractor-hours per acre. The fields were irrigated the usual 6 times and required 6.5 man-hours of labor for irrigating.

As picking fresh sweet corn is necessarily a hand operation, the size of crews and the number of power units used in connection with harvesting varied

Table 17.-Sweet corn for processing, average labor, tractor, truck, and horse hours for usual operations and sizes of implement, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre			
				Man	Tractor	Truck	Horse
Plow	1 bottom, 16 inch plow	11	1.0	2.1	2.1	---	---
Disk	6-foot tandem disk	12	1.0	.7	.7	---	---
Harrow	2-section harrow	8	2.0	.8	.8	---	---
Level	8-foot leveler	10	1.0	.6	.6	---	---
Corrugate	2-row cultivator	6	1.0	.9	.9	---	---
Ground preparation	-----	--	--	5.1	5.1	---	---
Plant	2-row planter	4	1.0	1.1	1.1	---	---
Irrigate	-----	12	6.0	6.5	---	---	---
Cultivate	2-row cultivator	6	3.0	4.0	4.0	---	---
Planting to Harvest	-----	--	---	11.6	5.1	---	---
Harvest	-----	9	1.0	13.7	---	---	10.5
Haul	-----	8	1.0	2.7	---	2.7	---
All harvest	-----	--	----	16.4	---	2.7	10.5
Total	-----	--	---	33.1	10.2	2.7	10.5

1/ In addition to these farms, horses were used for harrowing on 4 farms, corrugating on 3 farms, planting on 8 farms, and cultivating on 6 farms. Tractors and horses were used in harvesting on 1 farm, while on 2 farms harvesting and hauling were performed using only trucks. On 2 farms, hauling was done in trailers pulled by automobile or tractor.

2/ The average yield was 3.3 tons per acre and the average price received was $22.00 per ton.

greatly. The usual procedure was to pick the corn into wagons drawn by horses and then transfer it to trucks or trailers for hauling to the processing plant. For harvesting an average yield of 3.3 tons per acre, a total of 13.7 man-hours and 10.5 horse-hours were required, with an additional 2.7 man-and truck-hours required for hauling.

Hybrid Sweet Corn Seed

Production of hybrid sweet corn seed differs from sweet corn for processing in that it requires more hand labor. It is commonly hoed and the female line rows must necessarily be detasseled. Harvesting, however, can be mechanized, although some seed companies pay a premium for hand-picked seed. Average labor and power requirements for usual operations are shown in table 18.

Preparation of the ground required 5.9 man-and tractor-hours per acre, including corrugating for the pre-planting irrigation. The ground was harrowed more times than for any other specialty crop, usually about 5 times over.

Table 18.- Hybrid sweet corn seed, average labor and tractor hours for usual operations, and implement sizes, Boise and Payette Valleys of Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	1 bottom, 16 inch plow	19	1.0	2.1	2.1
Disk	6 foot tandem disk	18	1.0	.7	.7
Harrow	3 section harrow	11	5.0	1.5	1.5
Level	6 foot leveler	14	1.0	.7	.7
Corrugate	2 row cultivator	16	1.0	.9	.9
Ground preparation	-----	--	---	5.9	5.9
Plant	2 row planter	6	1.0	1.2	1.2
Harrow	3 section harrow	9	2.0	.6	.6
Irrigate	-----	19	7.0	6.3	---
Cultivate	2 row cultivator	18	4.0	4.7	4.7
Hoe	-----	12	1.0	11.4	---
Detassel	-----	14	9.0	36.2	---
Plant to harvest	-----	--	---	60.4	6.5
Combine	-----	2/ 11	1.0	10.2	2.7
Total	-----	--	---	76.5	15.1

1/ In addition to these farms horses were used for harrowing on 8 farms, for leveling on 3 farms, for corrugating on 2, for planting on 13, for post-planting harrowing on 6, and for cultivating on 1. On 2 farms, corn pickers were used for harvesting, while on 6 the corn was picked by hand.

2/ The average yield on these fields was 2,193 pounds per acre. The average on 19 farms was 2,409 pounds of clean seed per acre for which an average price of 9.66 cents per pound was received.

As was the case with sweet corn for processing, more farms reported planting with horse-powered than with tractor-powered planters. Tractor planting required 1.2 man-hours per acre, while horse planting required 1.6 man-hours and 3.2 horse-hours per acre.

Following planting, the corn was usually harrowed once or twice before and while the corn was coming up.

Cultivation was performed an average of 4 times, requiring a total of 4.7 man-and tractor-hours per acre. In addition to cultivation, the fields were usually hoed once at an average rate of one acre for 11.4 man-hours of labor. The fields were usually irrigated about 7 times, requiring 6.3 man-hours per acre.

Detasseling the female line rows was usually done about 9 times over on each field at an average rate of 4 man-hours per acre per time. The earlier times over are performed at a slower rate than the later ones as most of the tassels are produced during the first week or 10 days of the period. The fields must be continually gone over, although at greater time intervals, until the fertilization period is over, to remove stray and late tassels, especially if the variety or strain is susceptible to suckering.

After the detasseling period is over, some seed companies require that the male line rows (bull rows) be knocked or cut down so as to lessen the possibility of mixing the seed. Only three farms reported the practice, which was accomplished by hand cutting or knocking down with a cultivator. The corn was not salvaged for feed to any extent.

The usual method of harvesting was combining, which was done with crews ranging from 2 to 7 men. The size of the crew affected the speed of combining very little but the smallest crew used the fewest man-hours per acre and harvested the greatest amount of seed per hour. The main reason for the use of larger crews was to pick up the fallen corn missed by the combine. Some strains of corn fell badly and required extra men to glean behind the combine. Combining on 11 fields with an average yield of 2,193 pounds per acre required 10.2 man-hours and 2.7 tractor-hours per acre. Hand picking was considerably slower than combining and required almost 4 times as much hand labor. The one-row corn picker used on two farms picked at almost the same rate as did combines operated with 2 and 3 man crews, but required only about half as many man-hours per acre as did all combines, and picked more than twice as much seed per man-hour.

Lima Bean Seed

The planting and cultivation of lima bean seed was quite similar to sweet corn seed in respect to operations performed, rate of performance, and labor requirements (table 19.) However, fewer operations were performed with horses. Beans were more commonly hoed than corn, and the fields that were hoed were hoed more times. Hoeing was accomplished at a rate of approximately 0.1 acre per man-hour or 9.6 man-hours per acre covered.

Harvesting consisted of three operations, cutting with a bean cutter, raking (after an interval of 10 to 15 days), and combining, after another interval of approximately 15 days. The bean cutters were either of the two- or four-row type, with the latter pulled by larger tractors, although they did not cover twice

as much ground per hour. Raking was usually performed with 10-foot side delivery rakes. Combining from the windrow was the only method used for threshing beans. In some cases, regular combines were adjusted for use on beans. In other cases, special bean combines owned by the seed company were used to reduce cracking of the seed and thus improve germination.

Table 19. - Lima bean seed, average labor and tractor hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	1 bottom 16 inch plow	11	1.0	2.1	2.1
Disk	6 foot tandem disk	9	2.0	1.4	1.4
Harrow	3 section harrow	8	5.0	1.5	1.5
Level	6 foot leveler	8	2.0	1.4	1.4
Corrugate	4 row cultivator	7	1.0	.7	.7
Ground preparation	-----	--	---	7.1	7.1
Plant	4 row planter	10	1.0	.9	.9
Irrigate	-----	11	5.0	4.6	---
Cultivate	4 row cultivator	8	4.0	4.5	4.5
Hoe	-----	11	1.0	9.6	---
Plant to harvest	-----	--	---	19.6	5.4
Cut	4 row cutter	11	1.0	.8	.8
Rake	10 foot rake	11	1.0	.8	.8
Combine	-----	11	1.0	2.2	.9
All harvest 2/	-----	--	---	3.8	2.5
Total	-----	--	---	30.5	15.0

1/ One farm, not included here, used horses to disk, level, and plant. Two farms used them to harrow, and 3 to corrugate and cultivate.

2/ The average yield was 1,824 pounds per acre for which an average price of 10.4 cents per pound was received.

Onion seed

Production of onion seed requires 2 years from the time the seed is planted to harvesting. The first year of growth can be designated as production of bulbs and the second year as production of seed. The usual method of handling onion bulbs is to harvest them in the fall and replant them in the spring. However, some hardier varieties can remain in the ground over winter and be left to produce seed the following summer without replanting. This method of handling is called seed-to-seed production.

Onion bulb production.-Ground preparation and planting for onion bulbs is done with machinery but two operations - weeding and topping and picking - are performed entirely by hand. Labor requirements for these operations were heavy. The fields were commonly weeded 3 times (see table 20), and required an average

of 25.6 man-hours per acre covered, or a total of 76.8 man-hours per acre. Topping and picking required an average of 54.5 man hours per acre.

In addition to the usual operations shown in table 20 a few of the fields were marked prior to planting. On some a special trip over the field after planting was made to remove the ridges left by the planter in order to keep the seed at optimum depth. Dusting for insects was performed on a custom basis usually by airplane, but sometimes by tractor power dusters.

Table 20.- Onion bulbs, average labor and tractor-hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	1-bottom, 16 inch plow	5	1.0	2.1	2.1
Disk	6-foot tandem disk	5	1.0	.7	.7
Harrow	2-section harrow	5	2.0	.8	.8
Level	8-foot leveler	5	1.0	.6	.6
Bed	4-row bedder	2	1.0	1.1	1.1
Ground preparation	-----	-	---	5.3	5.3
Plant	4-row planter	5	1.0	1.1	1.1
Cultivate	4-row cultivator	5	5.0	5.7	5.7
Irrigate	-----	6	7.0	4.2	---
Weed-hoe	-----	6	3.0	76.8	---
Plant to harvest	-----	--	---	87.8	6.8
Lift 2/	2-row lifter	4	1.0	1.8	1.8
Top and pick 2/	-----	4	1.0	54.5	---
All harvest 3/	-----	--	---	56.3	1.8
Total	-----	--	---	149.4	13.9

1/ In addition to these farms, one farm used horses to harrow, level, plant, and cultivate.

2/ Excludes onion bulbs left in ground over winter for seed-to-seed production.

3/ The average yield was 3.4 hundredweight per acre for which an average price of $1.62 per hundredweight was received.

Onion seed production.- Production of onion seed requires even larger amounts of hand labor than does production of onion bulbs, because part of the planting operation uses heavy amounts of hand labor. Placing the bulbs in the row required about 10.4 man-hours per acre and 3.4 tractor hours (table 21) and setting the bulbs upright in the furrow required an additional 28.3 man-hours per acre. This operation, however, was not required on those fields grown on a seed-to-seed basis. The weeding operation was not as costly for seed as for bulbs; it required 45.8 man-hours per acre compared with 76.8 man-hours for bulbs. The chief reason for this difference was that the seed fields were weeded only

two-thirds as many times. On 2 farms mechanical weeders were used in place of hand weeding, and only 2.1 man-hours per acre were required. A few other farmers cultivated more often and were able to eliminate weeding altogether. Dusting operations were performed 2.3 times over on seed fields compared with 1.5 times over on bulb fields.

Cutting seed tops was entirely a hand operation, requiring an average of 76.8 man-hours per acre, with seed-to-seed fields requiring 139 man-hours per acre. However, as the average yield per acre was larger for seed-to-seed fields, the quantity of seed picked per man-hour was 8.75 pounds as compared with 8.22 pounds for seed from replanted bulbs.

Table 21.- Onion seed, average labor and tractor hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	14-bottom, 16-inch plow	11	1.0	2.1	2.1
Disk	6-foot tandem disk	9	1.0	.7	.7
Harrow	3-section harrow	6	2.0	.6	.6
Level	8-foot leveler	5	1.0	.6	.6
Ground preparation	-----	--	---	4.0	4.0
Furrow for planting	2-row cultivator	7	1.0	1.1	1.1
Plant	2-row planter	7	1.0	10.4	3.4
Set	-----	10	1.0	28.3	---
Cover	2-row cultivator	9	1.0	2.0	2.0
Cultivate 2/	2-row cultivator	13	4.0	4.9	4.9
Irrigate 2/	-----	14	7.0	4.6	---
Weed 3/	-----	6	2.0	45.8	---
Plant to harvest	-----	--	---	97.1	11.4
Cut 2/	-----	14	1.0	76.8	---
Turn 3/	-----	13	---	3.9	---
Thresh (incl. re-run of chaff)	-----	14	---	6.3	1.8
All harvest 4/	-----	--	---	87.0	1.8
Total	-----	--	---	188.1	17.2

1/ In addition to these farms 1 farm used horses to plow, disk, plant, cover, and cultivate. Five farms used horses for leveling. Two farms planted and set in the same operation by hand.
2/ Includes two fields of seed-to-seed onion seed.
3/ Includes one field of seed-to-seed onion seed.
4/ The average yield was 649 pounds per acre for which an average of 85.9 cents per pound was received.

Because of the large amount of hand labor required in other operations, ground preparation operations needed only about 2 percent of the total man-hours, but required about 25 percent of the total tractor hours. Harvest operations required almost half of the total man-hours, whereas planting and cultivating required about one-fourth each.

Carrot Seed

In many respects, production of carrot seed is similar to that of onion seed. Two growing seasons are required to produce seed. Roots grown the first year are usually dug up in the fall and replanted in the spring, although they may be left in the ground over winter and produce seed on a seed-to-seed basis. The root must be placed in an upright position by hand, and the ground is then usually firmed after planting. Weeds must also be hoed or pulled by hand, and the seed plant must be pulled from the ground by hand.

The number of fields surveyed that reported production of carrot roots was so small that no average production requirements can be given. However, production of carrot roots is similar to production of onion bulbs in harvesting requirements, but it does not require large amounts of labor for weed control. The young carrots are resistant to fuel oil, which is used to control the weeds until the carrots have gotten ahead of them.

The planting of carrot roots for seed production was performed at a rate of 0.3 acre per hour or 10.1 man-hours per acre (table 22). This was approximately the same rate as in planting onion bulbs for production of seed. However, placing in rows, setting in an upright position and in most cases, covering over the row was done in the same operation through the use of a 2-row planting sled. Following planting the field was usually cultipacked or rolled by a tractor at a rate of 1.3 acres per hour. Cultivating was performed at about the same rate as for onion seed, although one more time over. Hoeing required 11.9 man-hours per acre as opposed to 22.9 man-hours per acre for onion seed. The pulling and windrowing of carrot seed required an average of 11.1 man-hours per acre.

Threshing of carrot seed was done with a 4-or 5-man crew and a pick-up combine with a vertical cutter-bar on which the roots are cut off before the seed tops are thrown into the combine. The threshing operation required 10.9 man-hours per acre which was less than that required for pulling and windrowing.

Lettuce Seed

Production of lettuce seed also requires large amounts of hand labor, but not as much, or for as many operations as does production of root-crop seeds.

Ground preparation operations performed were approximately the same as for other seed crops. In addition to the operations shown in table 23, the fields on a few farms were bedded before planting, but this was not deemed necessary on the remainder of the fields. The only usual operations requiring hand labor were blocking or thinning, which required an average of 20.7 man-hours per acre, and hoeing, which required an average of 11.3 man-hours per acre covered and was usually performed only once.

Harvesting consisted of two distinct operations, cutting the seed tops, with a cutter or reaper or by hand, and combining the tops after a week of

Table 22.- Carrot seed, average labor and tractor hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	1 bottom, 16 inch plow	11	1.0	2.1	2.1
Disk	6-foot tandem disk	9	1.0	.7	.7
Harrow	2-section harrow	3	2.0	.8	.8
Level	8-foot leveler	3	1.0	.6	.6
Ground preparation	-----	--	---	4.2	4.2
Plant	2-row planter	11	1.0	10.1	3.4
Roll	5-foot roller	5	1.0	.8	.8
Cultivate	2-row cultivator	11	5.0	6.7	6.7
Irrigate	-----	12	7.0	7.1	---
Hoe	-----	6	1.0	11.9	---
Plant to harvest	-----	--	---	36.6	10.9
Pull and windrow	-----	12	1.0	11.1	---
Combine	-----	11	1.0	10.9	2.4
All harvest 2/	-----	--	---	22.0	2.4
Total	-----	--	---	62.8	17.5

1/ In addition to these farms, one farm reported using horses to plow, plant, and cultivate. Two farms used horses to roll the ground following planting, while 9 farms used them for harrowing. Four farms used horses for only the final cultivation.

2/ The average yield was 553 pounds per acre for which an average price of 38.8 cents per pound was received.

curing. Of 8 fields, 4 were cut with a cutter or reaper, 3 were cut by hand, and 1 was combined without prior cutting. The labor requirement for cutting with a cutter was 1.4 man-and tractor-hours per acre compared with 15.9 man-hours per acre for cutting seed by hand. However, yield was approximately 40 pounds per acre higher when cut by hand. The one farm which combined standing seed reported a man-labor requirement of only 3.2 man-hours and 1.6 tractor-hours per acre. However, the yield was only 145 pounds per acre compared with 320 pounds per acre for fields cut in advance of threshing. The operator said that standing fields should not be combined, as there is too much loss of seed from shattering. One farm reported a complete loss of seed through shattering by the wind before he could get a combine to harvest it.

Almost 80 percent of the total man-labor requirements was used between planting and harvesting. Blocking was the largest single operation. About 12 percent of the man labor was used for harvesting. However, if hand instead of mechanical cutting were used the percentage would increase to approximately 28 percent.

Table 23.- Lettuce seed, average labor and tractor hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	1 bottom, 16 inch plow	8	1.0	2.1	2.1
Disk	6-foot tandem disk	5	1.0	.7	.7
Harrow	3-section harrow	8	2.0	.6	.6
Level	8-foot leveler	8	1.0	.6	.6
Ground preparation	-----	-	---	4.0	4.0
Plant	4-row planter	8	1.0	1.3	1.3
Cultivate	4-row cultivator	8	6.0	9.7	9.7
Irrigate	------	9	5.0	3.3	---
Block	------	8	1.0	20.7	---
Hoe	------	7	1.0	11.3	---
Plant to harvest		-	---	46.3	11.0
Cut	4-row cutter	4	1.0	1.4	1.4
Thresh	-----	7	1.0	5.2	2.5
All harvest 2/	-----	-	---	6.6	3.9
Total	-----	-	---	56.9	18.9

1/ In addition to these farms one farm used horses for plowing, harrowing, leveling, planting, and cultivating. On 3 farms the lettuce tops were cut by hand, and on 1 farm the lettuce seed was combined standing in the field.

2/ The average yield was 310 pounds per acre for which an average price of 40.9 cents per pound was received.

Fresh Lettuce

Production of fresh lettuce is similar to that of lettuce seed so far as field operations are concerned until harvest time. More of the fresh-lettuce fields were bedded immediately before planting than were seed-lettuce fields, but the rates of performance were quite similar.

Rates of performance for usual operations on spring lettuce are shown in table 24, and for fall lettuce in table 25. Exclusive of harvesting operations fall lettuce shows about 10 man-hours less per acre than spring lettuce, all the difference being accounted for in planting to harvest operations. Blocking required 1.5 man-hours less per acre in summer than in spring, and hoeing 11.9 man-hours per acre less for fall lettuce. Weeds are easier to control on summer-planted irrigated fields. However, fall lettuce requires more irrigations than spring lettuce as it has to be "irrigated up." Fall lettuce also had slightly greater labor requirements for ground preparation. Although not all fields were

Table 24.- Spring lettuce, average labor and tractor hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting	Usual number of times over	Hours per acre	
				Man	Tractor
Plow	1 bottom, 18 inch plow	5	1.0	2.0	2.0
Disk	6-foot tandem disk	5	1.0	.7	.7
Harrow	3-section harrow	5	2.0	.6	.6
Level	8-foot leveler	5	1.0	.6	.6
Bed	2-row bedder	3	1.0	1.0	1.0
Ground preparation	-----	-	---	4.9	4.9
Plant	4-row planter	5	1.0	1.2	1.2
Cultivate	4-row cultivator	5	4.0	5.0	5.0
Irrigate	-----	5	4.0	4.3	---
Block	-----	5	1.0	18.7	---
Hoe	-----	4	2.0	21.3	---
Plant to harvest	-----	-	---	50.5	6.2
Total 1/	-----	-	---	55.4	11.1

1/ Does not include harvesting as all fields either were not harvested or were contract harvested.

plowed following the previous crop the presence of debris from the previous crops (usually lettuce) required an extra time over disking, with plowing following a first disking. Planting was done entirely with 4-row planters. On three farms the fields were rolled after planting. A field that had been planted in early winter was gone over with a spiked "crust-breaker" the first thing in the spring to break the crust that had formed on the ground during the winter.

Due to market conditions and alternate methods of selling, the only fields for which harvesting information could be obtained were fall lettuce fields. An average of 17.8 man-hours per acre were required to harvest an average yield of 136 crates per acre. This yield is smaller than normal because most fields were cut only once, and some of those were not cut as heavily as they might have been had there been a better market for smaller sized lettuce.

MAJOR PRODUCTION PROBLEMS

Some of the problems involved in production of seed and processing crops in the Boise and Payette Valleys are quality versus yield in processing crops, insect and weed control, availability of hand labor, and use of labor-saving equipment.

One of the biggest problems in producing peas for processing has been the timing of the harvesting operation to obtain the optimum quality consistent with

Table 25.- Fall lettuce, average labor, tractor, and truck hours for usual operations, and implement sizes, Boise and Payette Valleys, Idaho, 1947

Operation	Most common implement size	Number of farms reporting 1/	Usual number of times over	Hours per acre: Man	Tractor	Truck
Plow	1 bottom, 18 inch plow	6	1.0	2.0	2.0	---
Disk	6-foot tandem disk	9	2.0	1.4	1.4	---
Harrow	3-section harrow	8	2.0	.6	.6	---
Level	6-foot leveler	10	1.0	.7	.7	---
Bed	2-row bedder	7	1.0	.7	.7	---
Ground preparation	-----	-	---	5.4	5.4	---
Plant	4-row planter	10	1.0	.9	.9	---
Cultivate	4-row cultivator	10	4.0	4.9	4.9	---
Irrigate	-----	10	5.0	4.5	---	---
Block	-----	10	1.0	17.2	---	---
Hoe	-----	9	1.2	9.4	---	---
Plant to harvest	-----	--	---	36.9	5.8	---
Harvest 2/	-----	4	1.2	17.8	---	2.2
Total	-----	--	---	60.1	11.2	2.2

1/ In addition to these farms one farm used horses for harrowing.

2/ On farms on which lettuce was sold on a crate basis, the average yield was 136 crates per acre for which an average of $1.51 per crate was received.

high enough yields to net the greatest return for the crop. The processor attempts to spread out the harvest season by staggering planting dates, but cold weather during the growing season and the onset of hot weather during the harvest season usually combine to concentrate the harvest season over a shorter period than planned. As a result, some fields are harvested so late that they bring drastic reductions in quality and price. Although insect infestations are a problem, they can be controlled by dusting, usually by airplane. Another problem is low yields. In some cases, land planted to peas is poorer in quality and is unable to grow higher-yielding row crops so that low yields of peas could be expected too. However, some processors feel that some increase in yield could be obtained through elimination of waste in harvesting. When the fields are drilled the vines must be cut high enough to go over the corrugations. If the peas were planted in rows the vines could be cut at ground level and more of the pods harvested.

The main problem in producing sweet corn for processing has been the availability of labor for harvesting. In areas where the production of processing corn is heaviest some farmers have arranged to exchange labor pools among themselves, and by staggering planting dates have been able to avoid hiring labor.

However, in these cases the acreage is limited to a smaller amount than might otherwise be the case. The recent development of mechanical pickers for this crop can remove this limitation. Processing corn, as well as peas, has been limited in many cases to poorer land or land for which it is a good rotation crop.

A main problem in production of hybrid sweet corn seed is the obtaining of labor for detasseling. As obtaining crews at frequent intervals over a 3-to 4-week period is rather bothersome, many farmers contract for hybrid corn only if the seed company furnishes the crews for detasseling. Control of weeds is more important for seed than for processing corn, so that farmers also have the problem of getting labor for hoeing, although this is usually easier than for detasseling as it does not last as long.

Another problem involved in production of hybrid corn is that of matching planting dates of the male and female lines so that the male line will produce pollen at the time the female line is ready. This, however, is not a situation over which the farmer has full control, as it is chiefly a matter for the plant breeders to determine. In the few cases where a mismating occurs, the seed company usually makes an adjustment to cover the loss.

A main problem in producing lima bean seed is the lower yield compared with yields of some of the commercial beans grown in the area. At times when there is little difference in price some growers prefer not to grow limas because of the lower yields, and because they usually require some hoeing. Another problem in producing lima bean seed is obtaining a high percentage of germination of the seed. Timing of irrigations during the blooming period presumably affects it, but an important factor is the condition of adjustment in which the combine is kept during harvesting. If not in proper adjustment seed will be cracked and germination lowered. One seed company, through the use of a special bean harvester, claims to have increased germination 10 percent.

For onion seed and bulbs, some of the problems of production are determined by the variety of seed contracted to be grown. For some varieties, the bulbs must be dug in the fall, stored over winter, and planted again in the spring. Other varieties may be left in the ground over the winter, or dug up in the fall and immediately replanted. More seed can be produced from an acre of bulbs by replanting, but the additional yield must be balanced against the additional cost of digging and replanting.

A major production problem of onion seed and bulbs is the control of the onion thrip. Although it can be successfully controlled through the use of DDT, the additional cost of numerous dustings by airplane or tractor can raise costs to a point at which it is more desirable to grow some other crop.

Control of weeds is one of the more expensive operations in onion production, with the bulbs requiring even more attention than seed. There are the usual problems of availability of labor and its high cost as well as the problem of trying to substitute mechanical for hand methods, and planting on ground that is relatively weed free.

Some growers felt that a more dependable supply of local labor could be developed through the development of machines on which so-called "stoop-labor" could ride. Thus the back-breaking part of the operation would be eliminated. One grower developed a self-propelled "onion-planter" on which seats were placed within a few inches of the ground. Workers sat with their feet braced out ahead of them, while they worked with their hands between their legs setting onions. The per acre labor requirement was larger in using this machine than the strictly hand operation, but loss of time from break-downs was the prime cause of the larger labor requirement. The grower felt that labor could be saved after the "bugs" in the planter were eliminated. Other similar machines drawn by tractors were in use in the area for thinning beets and lettuce, and for weeding commercial onions. This same tendency toward "riding machines" commonly used in the Corn Belt, has also been directed toward the detasseling of hybrid corn, but no operator who had used such a machine was contacted.

For onion bulbs and carrot roots that are harvested for replanting in the spring, the problem of disease-free storage is at times a serious one. Some smaller operators turn the bulbs or roots over to the seed company in the fall at a certain price and buy them back in the spring at a predetermined higher price. Other growers have their own storage facilities and absorb their own losses from storage.

In the production of carrot seed and roots, control of weeds is not as difficult as for other root crops. As young carrots are resistant to fuel oil, oil spraying can be used to control the weeds until the carrots have gotten ahead of them. In cultivating carrot seed, care must be taken not to cultivate after the tops are high enough to be damaged by the cultivator. Some growers use a cultivator drawn by one horse to help in weed control after the tops are too high for a multiple-row cultivator.

Growers differ as to when to plant carrot seed. Some prefer to plant when danger of heavy frost is past; others plant as early in the spring as possible, saying that a frost which kills part of the plant is beneficial as it promotes the growth of more branches than usual and hence more seed.

In production of lettuce seed a major problem is harvesting without too much shattering. Care is taken to cut the seed when the tops are damp with dew, but wind remains an ever-present danger. It is important to locate plantings in fields that are as free of wind as possible.

For some varieties of lettuce seed, the stalk has difficulty in emerging from the head but this condition can be remedied by slashing the heads.

For fresh lettuce probably the main thing is getting it planted early enough. For spring lettuce some growers try to solve this problem by late fall or early winter plantings, but the success or failure of this method depends upon the type of winter weather.

The availability of labor and the difficulty of weed control are problems too but the problem of prime importance to the grower of fresh lettuce is finding a buyer when the crop is ready to be harvested. For the other crops discussed,

a buyer was found before planting the seed, through the process of contracting. For lettuce, however, availability of a buyer and the price are determined not only by the quality of the lettuce and the quantity available in the area. They hinge also on the condition of the lettuce crop in other primary lettuce-producing areas and of the buying market in distant cities. It is for this reason that fresh lettuce is called a "gambling crop" by many in this area.